

DETAILED ACTION

Election/Restrictions

I. This application contains claims 21-22, 25-27, 29-31, 36, 51-53, drawn to an invention nonelected with traverse filed on 10/06/2005.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 9, 16, 28, 37, 24, 34, 60, 35, 44-50, 62-76, 55-58, 85-88 are rejected under 35 U.S.C. 102(b) as being anticipated by McMillan et al. (5,650,593; hereinafter as McMillan)

As to claims 1, 24, 34, 58-59, 61, 85, McMillan discloses a substrate 12 (fig. 6); a die 18 (fig. 16) situated on the first surface of the substrate 12 and a plurality molded plastic stiffener components 217 (fig. 6) secured to the substrate without attachment with an adhesive element, the stiffener components 217 are inherently to increase rigidity of the substrate 12, wherein the substrate 12 and the stiffener components are separate components that are attached and secured together (fig. 6). Note that the stiffener components refer to the different side of the substrate having the stiffener thereon, similarly to the present invention.

As to claims 2, 37, McMillan discloses the invention substantially as claimed, including that the substrate is made of material such as polymer, polyamide layer, a bismaleimide triazine

(BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame (col. 6, lines 10-15).

As to claim 9, the stiffeners 217 comprises a thermoplastic material (col. 7, lines 30-65).

As to claims 64-66, 75, McMillan teaches that the molded stiffeners 217 are injection molded, or spray molded to the substrate 12 with encapsulating material 120 (fig. 3).

As to claims 16 and 28, McMillan teaches the stiffeners 217 or 17 (fig. 3) have one cross member (fig. 3).

As to claim 17, McMillan teaches the stiffeners 217 or 17 are in a form of a grid, lattice, a grille, and a web (fig. 3).

As to claim 76, McMillan teaches the substrate 12 (fig. 3) has two or more compartments for receiving dies 34 (fig. 3).

As to claims 86-88, similar to the rejection of claim 1, the stiffeners are in the form of strips or plate (fig. 6).

As to claims 24, 34, 60, McMillan teaches the semiconductor device having a substrate 12 (fig. 6) and a stiffeners 217 (fig. 6) molded to the first surface of the substrate 12 and a die 18.

As to claims 35 and 62-63, McMillan's stiffeners 17 are disposed at the periphery of the substrate 12 (fig. 3).

As to claim 47, McMillan teaches that the stiffener 17 (fig. 3) is bonded to the substrate by way of heating, cooling, and curing (col. 7, lines 30-65).

As to claims 44-50, 62-67, 69-76, similar to the structural elements in claim 1, McMillan discloses the molding of the stiffeners 217 on the substrate 12, wherein the stiffeners are formed from injection/spraying molding and then curing the molding material by cooling it for

hardening (col. 7, lines 30-65). Note that the encapsulating layer 122 is formed (fig. 3) on the stiffeners 17 (fig. 3) and covering the die 34 (fig. 3). As to claim 48, it is inherent once the device is formed singulating or dicing the substrate/leadframe to separate two or more die.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillan.

As to claims 3-8, McMillan discloses the invention substantially as claimed, except that the teaching of Mitchell does not explicitly teach that the substrate has a range of thickness of less than about 35-75 microns or that the stiffener has a thickness range of less than about 50-100 microns. Nonetheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the substrate with a specific range, since it is a prima facie obvious to an artisan for optimization and experimentation with a specific range of thickness because applicant has not yet established any criticality for the specific range.

Note that normally, it is to be expected that a change in temperature, or in thickness, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 19553.

6. Claims 10,11, 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillan, as applied to claim 1, in view of Admitted Prior Art (APA), figures 1-2 and specification (spec.), pages 1-2.

McMillan discloses a semiconductor device and method having a substrate 12 (fig. 6) a molded stiffener 217(fig. 5 or fig. 6) molded onto and secured to the substrate 12 without attachment with an adhesive element.

However, McMillan does not disclose that the stiffeners are made of a thermosetting material.

APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). See attachment. As to claims 10, 55-57, the molded stiffeners 14 comprise of thermoplastic or thermosetting polymeric material (spec., page 2, line12). Note that the molded stiffener is heated and cool to cure the material for hardening.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of McMillan with the thermosetting material for the stiffeners, as taught by APA, so as to provide an equal desirable material for the stiffener.

As to claim 11, APA teaches that the thermal coefficient of the expansion of the molded stiffeners 14 (fig. 1) and the substrate 6 (fig. 1) correspond such that when heating is applied both the stiffeners and the substrate expand roughly the same. See attachment.

7. Claims 23, 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over McMillan, as applied to claim 1, in view of Gregory (4,710,419).

McMillan discloses a semiconductor device and method having a substrate 12 (fig. 6) a molded stiffener 217(fig. 5 or fig. 6) molded onto and secured to the substrate 12 without attachment with an adhesive element, except that the substrate is in a form of a reel.

Gregory discloses a substrate 30 is in a form of a reel (figs. 2-7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the substrate of McMillan with the form of a reel, as taught by APA, for easy packaging.

As to claim 60, Gregory teaches the substrate comprises a leadframe 31 (figs.2-7) for reducing cost.

Response to Arguments

8. Applicant's arguments filed 02/07/08, have been fully considered but they are not persuasive.

In the remarks, applicants argue the cited reference, Gregory. The argument is moot in view of the new rejection.

Regarding to McMillan, applicants argue McMillan's stiffener 217 is a single continuous casing member. The examiner notes that in figure 11 of the present invention, the stiffeners are shown in cross-section. Figure 9 shows a top view of the present invention illustrating a single, continuous casing member 26 as a stiffener or stiffeners with respect to both sides of the substrate. Similarly to the McMillan's stiffener, in a cross-sectional view, the stiffener 217 is shown lying on both sides of the substrate, thereby being the stiffener components of the substrate.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If

attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspro.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

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